



King's Research Portal

DOI:

[10.1016/j.jad.2016.03.006](https://doi.org/10.1016/j.jad.2016.03.006)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Chibanda, D., Verhey, R., Gibson, L. J., Munetsi, E., Machando, D., Rusakaniko, S., Munjoma, R., Araya, R., Weiss, H. A., & Abas, M. (2016). Validation of screening tools for depression and anxiety disorders in a primary care population with high HIV prevalence in Zimbabwe. *Journal of Affective Disorders*, 198, 50-5. <https://doi.org/10.1016/j.jad.2016.03.006>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Validation of screening tools for depression and anxiety disorders in a primary care population with high HIV prevalence in Zimbabwe

Dixon Chibanda, Ruth Verhey, Lorna J Gibson, Epiphania Munetsi, Debra Machando, Simbarashe Rusakaniko, Ronald Munjoma, Ricardo Araya, Helen A Weiss, Melanie Abas



PII: S0165-0327(15)31311-2
DOI: <http://dx.doi.org/10.1016/j.jad.2016.03.006>
Reference: JAD8093

To appear in: *Journal of Affective Disorders*

Received date: 23 November 2015
Revised date: 3 March 2016
Accepted date: 5 March 2016

Cite this article as: Dixon Chibanda, Ruth Verhey, Lorna J Gibson, Epiphania Munetsi, Debra Machando, Simbarashe Rusakaniko, Ronald Munjoma, Ricardo Araya, Helen A Weiss and Melanie Abas, Validation of screening tools for depression and anxiety disorders in a primary care population with high HIV prevalence in Zimbabwe, *Journal of Affective Disorders* <http://dx.doi.org/10.1016/j.jad.2016.03.006>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Validation of screening tools for depression and anxiety disorders in a primary care population with high HIV prevalence in Zimbabwe

Dixon Chibanda^{1,*}, Ruth Verhey¹, Lorna J Gibson², Epiphania Munetsi¹, Debra Machando³, Simbarashe Rusakaniko¹, Ronald Munjoma¹, Ricardo Araya², Helen A Weiss², Melanie Abas⁴

¹Zimbabwe Aids Prevention Project-University of Zimbabwe Department of community medicine, 92 Prince Edward Street, Harare, Zimbabwe

²London School of Hygiene and Tropical Medicine, Keppel Street, London, UK.

³Women's University in Africa, Brighton Road, Mount Pleasant, Harare, Zimbabwe

⁴Institute of Psychiatry, Psychology and Neurosciences, King's College, London

*Corresponding author: dichi@zol.co.zw

Abstract:**Background**

In low income countries in Sub-Saharan Africa there are few validated tools to screen for common disabling mental disorders such as depression and general anxiety disorder (GAD).

Objectives

We validated three screening tools: the Shona Symptom Questionnaire for common mental disorders (SSQ-14), the Patient Health Questionnaire for depression (PHQ-9), and the Generalized Anxiety Disorder questionnaire (GAD-7). The study participants were attendees at a primary health care clinic in Harare, Zimbabwe.

Methods

Consecutive adults aged 18 and above attending the clinic were enrolled over a two-week period in September 2013. Trained research assistants administered the screening tools to eligible participants after obtaining written consent. Participants were then interviewed by one of four psychiatrists using the Structured Clinical Interview of the DSM-IV (SCID). Performance characteristics were calculated for each tool, against the SCID as the gold standard.

Results

A total of 264 participants were enrolled, of whom 52 (20%) met the SCID criteria for depression alone, 97 (37%) for mixed depression and anxiety and 9 (3%) for anxiety alone. Of the 237 where HIV status was known, 165 (70%) were HIV positive. With the optimal cutoff of >9, the sensitivity and specificity for the SSQ-14 against a diagnosis of either depression and/or general anxiety were 84% (95%CI:78-89%) and 73% (95%CI:63-81%) respectively. Internal reliability was high (Cronbach α

=0.74). The optimal cutoff for PHQ-9 was >11, which provided a sensitivity of 85% (95%CI:78-90%) and specificity of 69% (95%CI:59-77%) against a SCID diagnosis of depression (Cronbach α =0.86). The GAD-7 (optimal cutoff >10) had sensitivity and specificity of 89% (95%CI:81-94%) and 73% (95%CI:65-80%) respectively against a SCID diagnosis of GAD (Cronbach α =0.87).

Conclusion

Screening tools for depression and GAD had good performance characteristics in a primary health care population in Zimbabwe with a high prevalence of HIV. These can be used for research and also in clinical care to screen patients who may benefit from treatment

Keywords: depression, general anxiety disorder, validation, sensitivity, specificity, sub-Saharan Africa

Introduction

Common mental disorders (CMD) which consist of depression and anxiety disorders (Goldberg and Huxley, 1992; Todd et al., 1999) are a leading cause of disability globally (Steel et al., 2014). Almost three-quarters of people with CMD in low and middle income countries (LMIC) are estimated to be untreated (Lancet Global Mental Health Group et al., 2007). This is important because depression and anxiety are associated with consequences including lack of work productivity, loss of relationships and adverse impacts on development of offspring (Prince et al., 2007). Treating depression has been highlighted as a 'best-buy' condition globally (WHO, 2013). This has particular importance in settings with high HIV prevalence because detection and treatment of depression and other CMD in people living with HIV (PLWH) has the potential to improve adherence to antiretroviral therapy (ART) and thus physical outcomes (Abas et al., 2014a; Sin and DiMatteo, 2014). Identifying people with CMD using appropriately validated tools is the first step towards providing care for CMD (Akena et al., 2012b). Culturally appropriate and user friendly validated tools will be helpful for non-specialist workers, including lay health workers, to use to assess CMD and to guide clinical care.

The most widely used tool for screening for common mental disorders in Zimbabwe is the Shona Symptom Questionnaire (SSQ-14) (Patel et al., 1997), a non-specific tool that screens for possible depressive and anxiety disorders. The SSQ was previously validated in a general primary health care (PHC) population at a time

when HIV prevalence in the general Zimbabwean population was only 5% (Mertens et al., 1989). At that time the prevalence of CMD in primary care in Harare was reported to be 52% using international criteria (i.e. criteria influenced by external western models, also known as etic criteria) and 59% using indigenous criteria (i.e. criteria influenced by culture and tradition, also known as emic criteria (Patel and Mann, 1997). The current national prevalence of HIV infection is approximately 15% (Silverman et al., 2007) and contributes to the high public health burden at PHC level (Ferrand et al., 2010). As depression is twice as common in PLWH as in general populations and because depression symptoms in PLWH can overlap with HIV physical symptoms such as fatigue and appetite disturbance, it is important to validate tools for CMD in populations with high HIV prevalence (Tsai, 2014b). In LMIC, there are few validated tools for the screening of CMD in populations with a high prevalence of HIV (Chibanda et al., 2015a).

A further reason for validating tools is the emphasis in the last decade on disorder-specific tools both to improve care pathways for depression and anxiety and for research (Chibanda et al., 2014). The Patient Health Questionnaire (PHQ-9) for depression, and the Generalized Anxiety Disorder questionnaire (GAD-7) have each been found to be suitable screening tools for use at the PHC level in different settings (Kroenke and Spitzer, 2002; Kroenke et al., 2001; Monahan et al., 2009; Spitzer et al., 2006) but have not been validated in Zimbabwe, particularly in a high HIV-prevalent setting. Validating these tools both for screening and to guide treatment algorithms in our setting will enable researchers to better compare their findings with other populations receiving treatment in different locations, and to understand how depression and anxiety differ by geographic location and the composition of the patient population.

The aim of this study was to validate screening tools against a reference standard, the Structured Clinical Interview (SCID) of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), in a population with high prevalence of HIV in urban Zimbabwe.

Methods

Translation of tools

The first author, a bilingual psychiatrist (DC), carried out the first translation of the English versions of the PHQ-9 and GAD-into the local language, Shona. This draft Shona version was reviewed by a team including five Lay Health Workers (LHWs)

working in a primary care mental health program (Chibanda et al., 2011) a bilingual clinical psychologist (DM), a bilingual counselor (EpM) and DC. This phase focused on ensuring contextual equivalence to the original versions based on their understanding and use of local terms for mental distress including *kufungisisa* (thinking too much) (Kidia et al., 2015; Patel and Mann, 1997), *kusuwa* (to feel sad), *kusuwisisa* (to feel very sad) and *mwoyo unorwadza* (painful heart) (Abas et al., 1994).

The Shona versions of the tools were back-translated into English by a different independent language expert. A committee of the first author with the clinical psychologist and counselor examined both the original and back translated versions and resolved any discrepancies by consensus.

Tools

SSQ-14: The Shona Symptom Questionnaire (Patel et al., 1997) was developed and validated in Zimbabwe. Most of the items are those common in tools for depression worldwide such as sleep disturbance and suicidal thoughts; others are local idioms of emotional distress including 'thinking too much'. Participants are asked if they have experienced a list of common mental health symptoms in the past week. Each of the 14 items are scored dichotomously as yes (1) or no (0) (Patel et al., 1997)

PHQ-9: The Patient Health Questionnaire, which asks about symptoms over the past 2 weeks, derives its scoring system from the DSM-IV criteria for depressive disorders. **Scores:** Minor depression (**cutoff: 0-9**); moderate/moderately severe depression (**cutoff: 15-19**); severe depression (**cutoff: 20-27**) assesses symptoms of depression as listed in the DSM-IV over the past two weeks. Each of the nine items is scored from 0 (not at all) to 3 (nearly every day). It is used as a continuous score ranging from 0 (no depressive symptoms) to 27 (all symptoms occurring daily), and as a binary measure, with a cut-point of 10 or greater recommended in the US, (sensitivity and specificity for major depression of 88%) (Kroenke and Spitzer, 2002).

PHQ-2: This screening tool comprises the first two items from the PHQ-9, which enquire about loss of interest or pleasure in doing things and feeling down, hopeless or depressed (Lowe et al., 2005). The PHQ-2 is often used as an initial brief screening for depression, with individuals scoring >3 out of 6 then receiving the full PHQ-9 (Lowe et al., 2005; Monahan et al., 2009).

GAD-7: The Generalized Anxiety Disorder Screen (GAD-7) is a 7-item Likert scale that has been validated for the assessment of GAD in both clinical and research environments in different cultural settings (Kujanpaa et al., 2014; Lowe et al., 2008; Ruiz et al., 2011; Zhong et al., 2015). It consists of 7 items which measure severity of

symptoms according to reported responses with a maximum possible score of 21 (Spitzer et al., 2006). The questionnaire enquires about symptoms experienced in the last two weeks, such as “feeling nervous, anxious or on edge” and “not being able to stop or control worrying” (Lowe et al., 2008).

Structured Clinical Interview of the Diagnostic Statistical Manual for DSM-IV

Axis I Disorders (SCID): The SCID is a diagnostic examination used to determine major mental disorders. It is administered by a trained mental health professional such as a psychologist or psychiatrist in order to make a diagnosis based on the Diagnostic Statistical Manual version IV (DSM-IV) (APA, 1994). The professional administering the SCID requires clinical skills in the use of open-ended questions, diagnostic evaluations and cultural knowledge in a wide range of mental, neurological and substance use disorders (Mezzich et al.). In this validation study, the SCID was used to make a diagnosis of i) current major depression (mild, moderate and/or severe) and ii) GAD. Diagnosis of current major depression was based on the following 5 DSM-IV criteria met: A) Five or more symptoms present for more than two weeks and represent a significant change from previous functioning; B) Symptoms did not meet criteria for a mixed episode; C) Symptoms caused significant impairment in social occupational functioning; D) Symptoms were not due to the direct effects of a substance; and E) Symptoms were not better accounted for by bereavement. For GAD, the following DSM-IV criteria were used: A) Excessive anxiety and worry for at least 6 months; B) Difficulty in controlling the worry; C) Associated with 3 or more core symptoms; D) The focus of worry is not due to concerns of an Axis I disorder; E) The anxiety and worry causes clinically significant distress and impairment in functioning; F) The symptoms are not due to substance use.

Training procedures

Study personnel (four research assistants, six LHWs and four psychiatrists) attended a two-week training using a guide initially developed by the authors (DC and RV). The research assistants were trained in data collection methods using the socio-demographic forms and the screening tools during the first week of the training. The psychiatrists were trained in the use of the SCID through a discussion forum led by DC which involved going through the diagnostic criteria, building consensus on how to manage clinically severe cases during the validation, and procedures for ensuring fidelity. DC observed the psychiatrists during role-play and the pilot validation where each psychiatrist used the SCID to interview 4 patients. The referral pathways for participants meeting criteria for major depression and other acute medical conditions

was that they should be seen by the medical officer first, for assessment, before being referred to a tertiary psychiatric facility if needed.

Study Design and Location

The validation exercise was carried out as a cross-sectional study at the largest clinic in the suburb of Mbare, near the central business district of Harare, Zimbabwe. This clinic has a catchment area of over 200,000 with an average attendance of 140 patients per day. This is a typical primary care clinic in Harare, which is mostly staffed by nurses and lay health workers

Study population and recruitment

Adults attending the clinic during the two-week study period in September 2013 were eligible for recruitment, provided they were aged 18 years or older, were able to give written consent and resided in the area. Pregnant women in their last trimester and women within the 3-month postnatal period were excluded because for this population we had previously validated the Edinburgh Postnatal depression Scale (Chibanda et al., 2009), as were those who were unable to understand the purpose of the study.

Sample size

We aimed to recruit a representative sample of patients from a primary care clinic. A minimum of 75 participants who scored positive on the reference standard for depression (the SCID) and 75 who score negative on the SCID, would provide good precision for performance indicators: sensitivity of 91% (95%CI:82-96%); specificity of 80% (95%CI:69-88%), positive predictive value (PPV) of 82% (95%CI:72-90%) and negative predictive value (NPV) of 90% (95%CI:80-96%). We increased the sample size to 264 to allow for stratification by HIV status, assuming HIV prevalence of 60% in the clinic population (Ferrand et al., 2010)

The Validation Procedure:

Stage 1: Each morning during the study period, an appointed research assistant obtained the register of all adult patients waiting to be seen. The research assistant randomly selected clinic attendees based on a computer-generated random number sequence. Fifteen randomly selected participants were invited at one time to a quiet and private space where eligibility was determined. Informed written consent was sought from all those eligible. The six research assistants administered the SSQ-14, PHQ-9, and GAD-7 tools to participants according to a random order determined by DC and also collected socio-demographic information such as age, gender, HIV

status, marital and employment status. The interviews took 20-30 minutes and were conducted in a quiet space designated for the study team.

Stage 2: Following administration of the screening tools, participants were referred to one of four psychiatrists who conducted the SCID. The psychiatrists were blinded to the screening data. The SCID interview lasted 30 to 60 minutes in a private and quiet room. All those meeting criteria for DSM IV psychiatric condition were further assessed for treatment and referral to the psychiatric hospital.

Data collection and management

All data was double entered onto a password-protected database using Stata (version 13). No participant identifiable information was entered while ethics and confidentiality for all participants was respected in accordance with the medical research council of Zimbabwe

Analysis

The performance of each tool against the reference standard (SCID) was as follows: i) SSQ-14 against any CMD of depression and/or anxiety; ii) SSQ-14 against depression; iii) PHQ-9 against depression; iv) PHQ-2 against depression; v) GAD-7 against anxiety. For each association, we estimated the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) for different cut-points. For SSQ-14, PHQ-9 and GAD-7, the cut-point was chosen to provide a good balance of sensitivity and specificity. The PHQ-2 is intended for using as a screening tool prior to confirmation by PHQ-9, so high sensitivity was chosen for this tool. Results were presented in the form of a ROC curve which plots the true positive rate (sensitivity) against the false positive rate (1-specificity) (Pepe, 2003). The area under a ROC curve (AUC) quantifies the overall ability of the test to discriminate between those individuals with the outcome and those without the outcome. An AUC of 0.8 or above is 'good'. The optimal cut-point was selected to have a good balance of sensitivity and specificity, except for the PHQ-2 where the tool is used solely as a screening tool to be confirmed with PHQ-9, so high sensitivity was more important. Internal reliability was estimated using Cronbachs' α . All analyses were conducted using Stata (version 13).

Results

Of the 264 participants, 208 (79%) were female, 157 (60%) were married, and 199 (75%) had completed secondary school education (Table 1). HIV serostatus was known for 237 (90%) participants, of whom the majority (70%, n=165) were HIV

positive, and 151 (92%) of these were on ART. The prevalence of any CMD by SCID was high ($n=158$, 60%), with 52 participants (20%) meeting the SCID criteria for pure depression, 97 (37%) for mixed depression and anxiety and 9 (3%) for pure anxiety. CMD prevalence by SCID was substantially higher among PLWH than those without HIV (67% vs 39%; $p<0.001$). Prevalence of any CMD was significantly higher among PLWH than those without HIV (69% vs 41%; $p<0.001$).

Performance of the SSQ-14 against SCID diagnosis of any CMD (depression and/or anxiety)

An SSQ-14 cutoff of >9 provided the highest proportion of participants correctly classified comparing with SCID diagnosis of any CMD (82%). With this cutoff, sensitivity was 84% (95%CI:78-89%) and specificity was 73% (95%CI:63-81%; Table 2; Figure 1). The ROC curve for the performance of SSQ-14 against any CMD gave an AUC of 0.86 (95%CI 0.81-0.90; Figure 2) and showed good internal consistency (Cronbach's $\alpha=0.74$). With this cutoff of >9 the prevalence of CMD was 61% (95%CI:55-67%) with PPV 82% (95%CI:75-88%) and NPV 75% (95%CI:66-83%). Among PLWH, the prevalence of CMD by SSQ-14 was 68% with PPV/NPV of 89%/74%, while among those without HIV the prevalence was 51% with PPV/NPV 62%/80%. Sensitivity and specificity were higher among PLWH than HIV negative participants (sensitivity=88% vs. 77%; specificity 76% vs. 67%; Table 2; Figure1).

Performance of the SSQ-14 against SCID diagnosis of depression

Similar results were seen for the SSQ-14 against a diagnosis of depression (pure depression or depression mixed with anxiety), with sensitivity of 86% (95%CI:80-92%), specificity 70% (95%CI:61-79%), PPV 79% (95%CI:72-85%) and NPV 79% (95%CI:70-87%). The tool performed better among PLWH than HIV negative participants (sensitivity=87% vs. 82%; specificity 71% vs. 66%; Table 2; Figure 1).

Performance of the PHQ-9 against SCID diagnosis of depression

For the PHQ-9, the optimal cutoff of >11 provided sensitivity for detecting depression (pure depression or depression mixed with anxiety) of 85% (95%CI:78-90%) and specificity of 69% (95%CI:59-77%; Table 2). The ROC curve gave an AUC of 0.84 (95%CI 0.79-0.88). The PPV was 78% (95%CI:71-84%) and NPV was 77% (95%CI:68-85%). The sensitivity was higher among PLWH than HIV negative individuals (88% vs. 79%), but the specificity was similar by HIV status (71 vs. 73%; Table 2). Internal consistency was very good (Cronbach's $\alpha=0.86$).

The PHQ-2 had high sensitivity as a screening tool with a cutoff of >2 (sensitivity 91%; 95%CI 86-95%) although this had low specificity (40%; 95%CI:31-50%; Figure 1; Table 2), and this chosen as the optimal cut-point as individuals screening positive would have a confirmatory test with PHQ-9.

Performance of the GAD-7 against SCID diagnosis of anxiety

A cutoff of >10 for GAD-7 gave a sensitivity of 89% (95%CI:81-94%) and specificity of 73% (95%CI:65-80%; Table 2; Figure 1), for detecting anxiety (pure anxiety or depression mixed with anxiety), correctly classifying 79% of participants. The PPV was 69% (95%CI:60-76%) and NPV was 91% (95%CI 84-95%). The ROC curve gave an AUC of 0.90 (95%CI 0.87-0.94; Figure 3). Again, the sensitivity was higher among PLWH than HIV negative individuals (94% vs. 75%) but specificity was lower among PLWH (68% v 80%; Table 2; Figure 1). There was very good internal consistency (Cronbachs $\alpha=0.87$).

Discussion

As interventions for CMD are scaled-up in sub-Saharan Africa, the need for user-friendly validated tools is critical (Abas et al., 2014b). We recently highlighted the absence of validated tools in clinical trials of psychological interventions for PLWH in LMIC (Chibanda et al., 2015b). This study demonstrates the feasibility of validating a series of screening tools for CMD among populations with high prevalence of PLWH in a resource limited setting. We found the three screening tools (SSQ-14, PHQ-9, and GAD-7) have good internal consistency and performance characteristics.

All the tools validated in this study were developed in a Western setting (Kroenke et al., 2001; Lowe et al., 2008) except for the SSQ-14, which was developed in Zimbabwe using cross-cultural methods in an era of low HIV prevalence (Patel et al., 1997). The SSQ-14 had been previously validated with a cutoff of >8 (Patel et al., 1997) but this cut-off provided relatively low specificity (57%) in our current setting with high HIV prevalence setting. Using a cutoff of >9 , we see improved specificity (70%) with little loss of sensitivity (94% vs. 85%). Overall, 74% of participants were correctly classified with a cutoff of >8 , compared with 79% using a cutoff of >9 and we recommend use of the higher cutoff in this setting. The high prevalence of CMD in this population gives stability to the PPV, which is influenced by the prevalence of

the condition under study. Most true positives according to SCID are detected (84%) with a cutoff of >9 in the total sample and among PLWH (88%).

Our chosen cut-off of >11 for the PHQ-9 is within the range (8-11) reported as acceptable for detecting depression in a recent meta-analysis on optimal cut-off scores for diagnosing depression with the PHQ-9 (Manea et al., 2012). A recent study from South Africa recommended a cut-off of >10 , although this gave a low sensitivity of 49% and a specificity of 94% (Bhana et al., 2015).

The PHQ-2 has been recommended as an initial screen before administering the full PHQ-9 (Lowe et al., 2005; Monahan et al., 2009) and we recommend a cutoff of >2 which has high sensitivity (91%), assuming that a confirmatory test follows.

The validation of the SSQ-14, PHQ-9, and GAD-7 among PLWH is consistent with our earlier work which reveals the need to utilize culturally sensitive and adequately validated tools in LMIC, particularly among PLWH (Abas et al., 2014b). We utilized a multi-disciplinary team consisting of medical professionals, experts in the English and Shona (indigenous language) as well as lay health workers who have a deep cultural understanding of local concepts of depression at community level to ensure acceptability of our final validated tools. Furthermore, the use of clinicians to administer the reference standard ensured accuracy in diagnosis by reducing the risk of misclassification of CMD due, for example, to HIV-associated cognitive impairment, and general physical symptoms associated with HIV infection as has been reported (Tsai, 2014a). Our validated tools have shown good internal consistency, high sensitivity and acceptable specificity.

Prevalence of HIV is increasing in sub-Saharan Africa due to decreases in mortality as access to antiretroviral therapy is scaled up, and strength of our study was the focus on performance of scales among PLWH. The results will enable local researchers developing epidemiological and intervention studies to work with more accurate cut-off scores with PLWH. The tools showed consistently better performance among PLWH than HIV negative individuals, because of the high prevalence of CMD in the HIV positive group. A limitation of our study is that we had relatively low precision to evaluate the tools in people living without HIV.

While evidence supporting the use of LHWs is growing (van Ginneken et al., 2013) the need to build capacity in the area of intervention development and particularly

validation of culturally sensitive tools for use by LHWs has been emphasized (Akena et al., 2012b). In sub-Saharan Africa, where literacy rates can be extremely low, there is a need to consider the validation of visual screening tools such as has been the case in Uganda, where a visual screening tool for depression was found to have good internal consistency (Akena et al., 2012a). Limitations of our study include the absence of data on stages of HIV disease, CD4 count, viral load and type of HAART as these can affect CMD manifestation in PLWH (Akena et al., 2010; Evans et al., 2002; Pecoraro et al., 2015). Performance of tools for depression could potentially vary by other factors such as education and gender which we have not investigated in this paper. There has been concern about using standard tools when screening for depression in PLWH due to possible overlap of somatic symptoms with HIV-disease symptoms, and due to the difficulty in separating some depression-related symptoms from symptoms caused by HIV-associated neurocognitive disorder. This will be a matter of investigation for a further study.

Conclusion

We have successfully validated different tools for common mental disorders in a high HIV prevalent setting, showing good performance but with slightly different cutoffs compared with those used in low HIV prevalence settings. Although our findings can be generalized to similar settings in Zimbabwe and in the southern African region where HIV prevalence is high in health service users, there is still need for further research in sub-Saharan Africa to develop and validate tools that are user-friendly for LHWs to use in everyday practice.

Acknowledgements

Staff at Edith Opperman Polyclinic Mbare for continued support to the Friendship Bench initiative, Percy Taruvinga, Tarisai Bere, for training of LHWs and translating documents.

This study was supported through a Grand Challenges Canada (GCC) grant.

Contribution

DC Study design, initial analysis, first draft and review of subsequent drafts leading to final manuscript

RV Training of research assistants, review of drafts

EtM Coordinating the recruitment process, review of drafts

RM Recruitment of study participants, data cleaning and review of 3rd draft

EpM Recruitment of participants review of drafts

DM Translation of documents review of drafts

SR review final draft

LG data cleaning, analysis and review of drafts

RA Study design, review of drafts

HW Study design, data analysis, review of drafts

MA Data interpretation, review of drafts

References

- Abas, M., Ali, G., Nakimuli-Mpungu, E., Chibanda, D., 2014a. Depression in people living with HIV in sub-Saharan Africa: time to act. *Trop Med Int Health* 19, 1392-1396.
- Abas, M., Ali, G.C., Nakimuli-Mpungu, E., Chibanda, D., 2014b. Depression in people living with HIV in sub-Saharan Africa: time to act. *Trop Med Int Health* 19, 1392-1396.
- Abas, M., Broadhead, J.C., Mbape, P., Khumalo-Sakatukwa, G., 1994. Defeating depression in the developing world: a Zimbabwean model. *Br J Psychiatry* 164, 293-296.
- Akena, D., Joska, J., Musisi, S., Stein, D.J., 2012a. Sensitivity and specificity of a visual depression screening instrument among HIV-positive individuals in Uganda, an area with low literacy. *AIDS Behav* 16, 2399-2406.
- Akena, D., Joska, J., Obuku, E.A., Amos, T., Musisi, S., Stein, D.J., 2012b. Comparing the accuracy of brief versus long depression screening instruments which have been validated in low and middle income countries: a systematic review. *BMC Psychiatry* 12, 187.
- Akena, D.H., Musisi, S., Kinyanda, E., 2010. A comparison of the clinical features of depression in HIV-positive and HIV-negative patients in Uganda. *Afr J Psychiatry (Johannesbg)* 13, 43-51.
- APA, 1994. Diagnostic criteria from DSM-IV. Amer Psychiatric Pub Inc.
- Bhana, A., Rathod, S.D., Selohilwe, O., Kathree, T., Petersen, I., 2015. The validity of the Patient Health Questionnaire for screening depression in chronic care patients in primary health care in South Africa. *BMC Psychiatry* 15, 118.
- Chibanda, D., Benjamin, L., Weiss, H.A., Abas, M., 2014. Mental, neurological, and substance use disorders in people living with HIV/AIDS in low- and middle-income countries. *J Acquir Immune Defic Syndr* 67 Suppl 1, S54-67.
- Chibanda, D., Bowers, T., Verhey, R., Rusakaniko, S., Abas, M., Weiss, H.A., Araya, R., 2015a. The Friendship Bench programme: a cluster randomised controlled trial of a brief psychological intervention for common mental disorders delivered by lay health workers in Zimbabwe. *International journal of mental health systems* 9, 21.
- Chibanda, D., Cowan, F.M., Healy, J.L., Abas, M., Lund, C., 2015b. Psychological interventions for Common Mental Disorders for People Living With HIV in Low- and Middle-Income Countries: systematic review. *Trop Med Int Health* 20, 830-839.
- Chibanda, D., Mangezi, W., Tshimanga, M., Woelk, G., Rusakaniko, P., Stranix-Chibanda, L., Midzi, S., Maldonado, Y., Shetty, A., 2009. Validation of the

- Edinburgh Postnatal Depression Scale among women in a high HIV prevalence area in urban Zimbabwe. *Archives of Women's Mental Health* 13, 201-206.
- Chibanda, D., Mesu, P., Kajawu, L., Cowan, F., Araya, R., Abas, M., 2011. Problem-solving therapy for depression and common mental disorders in Zimbabwe: piloting a task-shifting primary mental health care intervention in a population with a high prevalence of people living with HIV. *BMC Public Health* 11, 828.
- Evans, D.L., Ten Have, T.R., Douglas, S.D., Gettes, D.R., Morrison, M., Chiappini, M.S., Brinker-Spence, P., Job, C., Mercer, D.E., Wang, Y.L., Cruess, D., Dube, B., Dalen, E.A., Brown, T., Bauer, R., Petitto, J.M., 2002. Association of depression with viral load, CD8 T lymphocytes, and natural killer cells in women with HIV infection. *Am J Psychiatry* 159, 1752-1759.
- Ferrand, R.A., Munaiwa, L., Matsekete, J., Bandason, T., Nathoo, K., Ndhlovu, C.E., Munyati, S., Cowan, F.M., Gibb, D.M., Corbett, E.L., 2010. Undiagnosed HIV infection among adolescents seeking primary health care in Zimbabwe. *Clin Infect Dis* 51, 844-851.
- Goldberg, Huxley, 1992. *Common Mental Disorders: A bio-social model*. Routledge, London.
- Kidia, K., Machando, D., Bere, T., Macpherson, K., Nyamayaro, P., Potter, L., Makadzange, T., Munjoma, R., Marufu, M., Araya, R., Safren, S., O'Cleirgh, C., Chibanda, D., Abas, M., 2015. "I was thinking too much": experiences of HIV-positive adults with common mental disorders and poor adherence to antiretroviral therapy in Zimbabwe. *Trop Med Int Health*.
- Kroenke, K., Spitzer, R., 2002. The PHQ-9: A New Depression Diagnostic and Severity Measure. *Psychiatric Annals* 32.
- Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 16, 606-613.
- Kujanpaa, T., Ylisaukko-Oja, T., Jokelainen, J., Hirsikangas, S., Kanste, O., Kyngas, H., Timonen, M., 2014. Prevalence of anxiety disorders among Finnish primary care high utilizers and validation of Finnish translation of GAD-7 and GAD-2 screening tools. *Scandinavian journal of primary health care* 32, 78-83.
- Lancet Global Mental Health Group, Chisholm, D., Flisher, A.J., Lund, C., Patel, V., Saxena, S., Thornicroft, G., Tomlinson, M., 2007. Scale up services for mental disorders: a call for action. *Lancet* 370, 1241-1252.
- Lowe, B., Decker, O., Muller, S., Brahler, E., Schellberg, D., Herzog, W., Herzberg, P.Y., 2008. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care* 46, 266-274.
- Lowe, B., Kroenke, K., Grafe, K., 2005. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *J Psychosom Res* 58, 163-171.
- Manea, L., Gilbody, S., McMillan, D., 2012. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne* 184, E191-196.
- Mertens, T., Tondorf, G., Siebolds, M., Kruppenbacher, J.P., Shrestha, S.M., Mauff, G., Gurtler, L., Eggers, H.J., 1989. Epidemiology of HIV and hepatitis B virus (HBV) in selected African and Asian populations. *Infection* 17, 4-7.
- Mezzich, J.E.M.D., Kirmayer, L.J.M.D., Kleinman, A.M.D., Fabrega, H.J.M.D., Parron, D.L.P.D., Good, B.J.P.D., Lin, K.M.M.D., Manson, S.M.P.D., The Place of Culture in DSM-IV. *Journal of Nervous & Mental Disease* 187, 457.
- Monahan, P.O., Shacham, E., Reece, M., Kroenke, K., Ong'or, W.O., Omollo, O., Yebei, V.N., Ojwang, C., 2009. Validity/reliability of PHQ-9 and PHQ-2 depression

- scales among adults living with HIV/AIDS in western Kenya. *J Gen Intern Med* 24, 189-197.
- Patel, V., Mann, A., 1997. Etic and emic criteria for non-psychotic mental disorder: a study of the CISR and care provider assessment in Harare. *Social Psychiatry & Psychiatric Epidemiology* 32, 84.
- Patel, V., Simunyu, E., Gwanzura, F., Lewis, G., Mann, A., 1997. The Shona Symptom Questionnaire: the development of an indigenous measure of common mental disorders in Harare. *Acta Psychiatrica Scandinavica* 95, 469.
- Pecoraro, A., Mimiaga, M., O'Cleirigh, C., Safren, S.A., Blokhina, E., Verbitskaya, E., Yaroslavl'tseva, T., Ustinov, A., Lioznov, D.A., Zvartau, E., Krupitsky, E., Woody, G.E., 2015. Depression, substance use, viral load, and CD4+ count among patients who continued or left antiretroviral therapy for HIV in St. Petersburg, Russian Federation. *AIDS Care* 27, 86-92.
- Pepe, M., 2003. *The Statistical Evaluation of Medical tests for Classification and Predication*. Oxford University Press, New York.
- Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M.R., Rahman, A., 2007. No health without mental health. *Lancet* 370, 859-877.
- Ruiz, M.A., Zamorano, E., Garcia-Campayo, J., Pardo, A., Freire, O., Rejas, J., 2011. Validity of the GAD-7 scale as an outcome measure of disability in patients with generalized anxiety disorders in primary care. *J Affect Disord* 128, 277-286.
- Silverman, J.G., Decker, M.R., Gupta, J., Maheshwari, A., Willis, B.M., Raj, A., 2007. HIV prevalence and predictors of infection in sex-trafficked Nepalese girls and women. *JAMA: the journal of the American Medical Association* 298, 536.
- Sin, N.L., DiMatteo, M.R., 2014. Depression treatment enhances adherence to antiretroviral therapy: a meta-analysis. *Ann Behav Med* 47, 259-269.
- Spitzer, R.L., Kroenke, K., Williams, J.B., Lowe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 166, 1092-1097.
- Steel, Z., Marnane, C., Iranpour, C., Chey, T., Jackson, J.W., Patel, V., Silove, D., 2014. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. *Int J Epidemiol* 43, 476-493.
- Todd, C., Patel, V., Simunyu, E., Gwanzura, F., Acuda, W., Winston, M., Mann, A., 1999. The onset of common mental disorders in primary care attenders in Harare, Zimbabwe. *Psychological Medicine* 29, 97-104.
- Tsai, A.C., 2014a. Reliability and validity of depression assessment among persons with HIV in sub-Saharan Africa: systematic review and meta-analysis. *J Acquir Immune Defic Syndr* 66, 503-511.
- Tsai, A.C., 2014b. Reliability and validity of depression assessment among persons with HIV in sub-Saharan Africa: systematic review and meta-analysis. *JAIDS* 66, 503-511.
- van Ginneken, N., Tharyan, P., Lewin, S., Rao, G.N., Meera, S.M., Pian, J., Chandrashekar, S., Patel, V., 2013. Non-specialist health worker interventions for the care of mental, neurological and substance-abuse disorders in low- and middle-income countries. *The Cochrane database of systematic reviews* 11, CD009149.
- WHO, 2013. *Investing in Mental Health: Evidence for Action*. World Health Organization, Geneva.
- Zhong, Q.Y., Gelaye, B., Zaslavsky, A.M., Fann, J.R., Rondon, M.B., Sanchez, S.E., Williams, M.A., 2015. Diagnostic Validity of the Generalized Anxiety Disorder - 7 (GAD-7) among Pregnant Women. *PLoS One* 10, e0125096.

Figure 1: Sensitivity and specificity by tool and HIV status

Figure 2: ROC curve for SSQ against CMD - depression and/or anxiety by SCID (n=264)

Accepted manuscript

Table 1. Characteristics of study participants

Characteristic	All participants (n=264)	
	N	%
Gender		
Male	56	21.2%
Female	208	78.8%
Age group		
<30	58	22.8%
30-39	91	35.8%
40-49	72	28.4%
50+	33	13.0%
Marital status		
Married/partnered	157	59.5%
Divorced/widowed	52	19.7%
Single	55	20.8%
Education		
Primary or less	65	24.6%
Secondary or more	199	75.4%
Current employment status		
Unemployed	112	42.4%
Permanent full time/part time	26	9.9%
Casual/self-employed	126	47.7%
Main income source		
Own business/salary	149	56.4%
Partner/family	98	37.1%
No income	17	6.4%
Suffer from chronic illness	120	45.5%
Negative life event in last six months	237	89.8%
HIV prevalence¹	165	69.6%
Prevalence of common mental disorders using the reference standard		
SCID-pure depression	52	19.7%
SCID- pure anxiety	9	3.4%
SCID-mixed depression/anxiety	97	36.7%
SCID –any CMD (SCID depression and/or anxiety)	158	59.8%
Prevalence of common mental disorders using the tools		
SSQ-14 score (median and IQR)	9	7-11
SSQ ≥ 9	162	61.4%
PHQ-9 score (median and IQR)	13	8-18
PHQ-9 ≥ 11	162	61.4%
PHQ-2 score (median and IQR)	3	2-5
PHQ-2 ≥ 2	205	77.7%
GAD-7 score (median and IQR)	10	6-15
GAD-7 ≥ 10	137	51.9%

¹ Of the 237 with known HIV status

Table 2. Sensitivity and specificity of tools, overall and by HIV status

Tool	Cutpoint	Reference standard	All participants		HIV positive participants		HIV negative participants	
			Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)
SSQ-14	≥9	SCID - any CMD ¹	84% (78-89%)	73% (63-81%)	88% (80-93%)	76% (63-87%)	77% (58-90%)	67% (50-80%)
SSQ-14	≥9	SCID-depression ²	86% (79-91%)	70% (61-79%)	87% (80-93%)	71% (57-82%)	82% (63-94%)	68% (52-81%)
PHQ-9	≥11	SCID-depression ²	85% (78-90%)	69% (59-77%)	88% (81-94%)	71% (57-82%)	79% (59-92%)	73% (57-85%)
PHQ-2	≥2	SCID-depression ²	91% (86-95%)	40% (31-50%)	92% (85-96%)	25% (15-39%)	93% (76-99%)	59% (43-74%)
GAD-7	≥10	SCID-anxiety ³	89% (81-94%)	73% (65-80%)	94% (86-98%)	68% (57-78%)	75% (68-90%)	80% (68-88%)

¹ CMD=any SCID pure depression, pure anxiety or mixed depression/anxiety.

² Pure Depression or mixed depression/anxiety

³ Pure Anxiety or mixed depression/ anxiety

Highlights

- Validation of screening tools in sub-Saharan Africa is an important step towards addressing the treatment gap for common mental disorders.
- Special consideration is needed when validating tools in a high HIV prevalent setting
- It is possible to validate multiple tools in a high HIV prevalent setting in low resource settings.

Figure 1

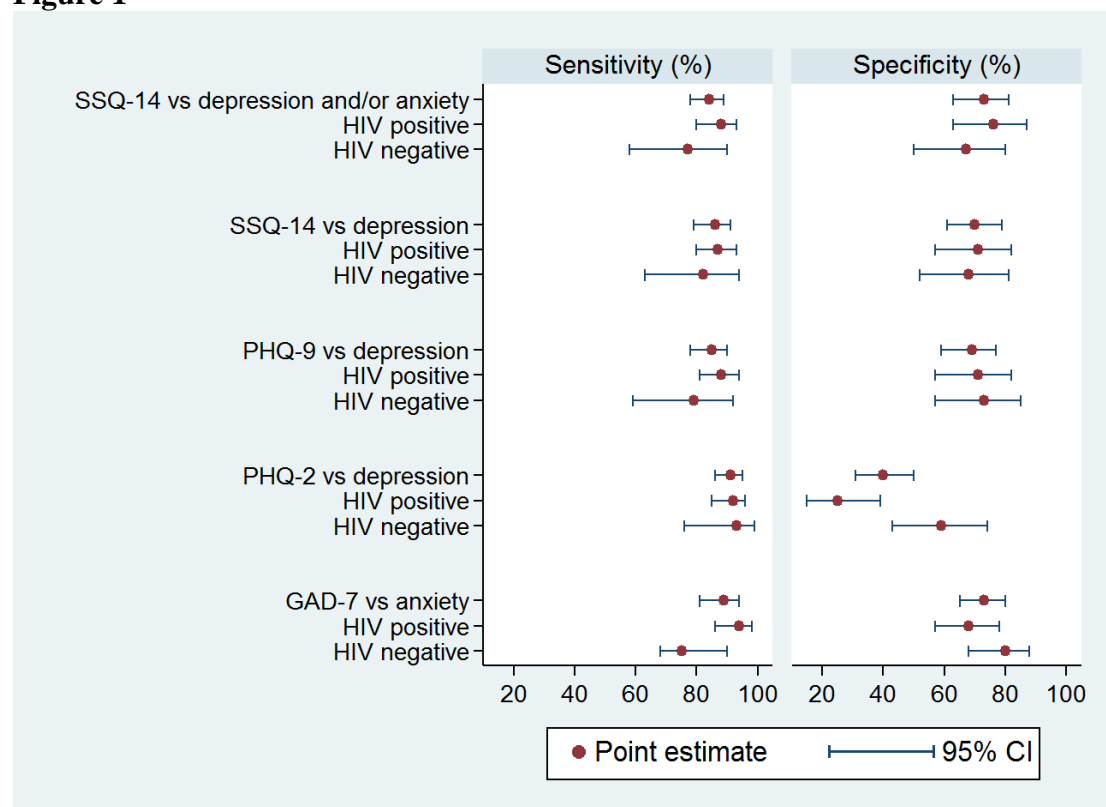


Figure 2: